

WHAT IS CLAIMED IS:

- [c01]            1.    A process for embossing a film, the process comprising:
- heating a resin and forming a flowable melt;
- directing the flowable melt to a first nip;
- embossing a first side of the flowable melt and cooling a second side of the flowable melt to form an embossed film; and
- cooling the embossed film.
- [c02]            2.    The process according to Claim 1, wherein directing the flowable melt into the first nip comprises extruding the flowable melt from an extruder apparatus.
- [c03]            3.    The process according to Claim 1, wherein embossing the first side of the flowable melt and cooling the second side of the flowable melt to form the embossed film comprises contacting the first side of the flowable melt with an embossing tool at a temperature greater than a glass transition temperature of the resin and contacting the second side of the flowable melt with a backside roll at a temperature less than the glass transition temperature of the resin.
- [c04]            4.    The process according to Claim 3, wherein the temperature of the backside roll is greater than or equal about 5°C lower than the glass transition temperature of the resin.
- [c05]            5.    The process according to Claim 3, wherein the temperature of the embossing tool is greater than or equal to about 10°C higher than the glass transition temperature (T<sub>g</sub>) of the resin
- [c06]            6.    The process according to Claim 1, further comprising biasing the direction of the flowable melt into the nip toward the embossing tool.

[c07] 7. The process according to Claim 1, wherein the resin is selected from the group consisting of thermoplastics, thermosets, copolymers, reaction products, and combinations comprising at least one of the foregoing resins.

[c08] 8. The process according to Claim 1, further comprising exposing the embossed film to a vibrating sonic welding head.

[c09] 9. The process according to Claim 1, further comprising engaging a carrier film with the backside roll for introducing the carrier film into the first nip; and frangibly fusing the carrier film to the second side of the embossed film.

[c10] 10. The process according to Claim 9, further comprising applying a release coat to the carrier film prior to introducing the carrier film into the first nip.

[c11] 11. The process according to Claim 9, further comprising applying a transfer film to the carrier film prior to introducing the carrier film into the first nip.

[c12] 12. The process according to Claim 9, wherein the carrier film comprises a seamless loop of film wound about two or more rollers.

[c13] 13. The process according to Claim 9, further comprising frangibly fusing a textured surface of the carrier film to the second side to replicate the textured surface onto the second side of the embossed film.

[c14] 14. The process according to Claim 1, further comprising engaging a backing film with the backside roll for introducing the backing film into the first nip; and fixedly attaching the backing film to the second side of the embossed film.

[c15] 15. The process according to Claim 14, wherein the backing film and the resin comprise the same material.

[c16] 16. A process for producing an embossed film, the process comprising:

heating a resin and forming a flowable melt;

directing a carrier film and the flowable melt to a first nip;

embossing a first side of the flowable melt and cooling a second side of the flowable melt in contact with the carrier film to form an embossed film frangibly fused to the carrier film, wherein the second side is textured with a surface texture provided by the carrier film;

cooling the embossed film; and

separating the carrier film from the embossed film.

[c17] 17. An apparatus for producing a film having a surface with an embossed pattern, the apparatus comprising:

means for heating a resin to form a flowable melt and directing the flowable melt into a first nip formed between an embossing tool and a backside roll;

means for maintaining the embossing tool at a temperature greater than a glass transition temperature of the resin;

means for maintaining the backside roll at a temperature lower than the glass transition temperature of the resin; and

means for pressing the embossing tool and backside roll together to transfer an embossed pattern to a first side of the melt and produce an embossed film.

[c18] 18. The apparatus according to Claim 17, wherein the embossing tool comprises an embossing belt or an embossing roll.

[c19] 19. The apparatus according to Claim 17, wherein the means for flowing the melt comprises an extruder apparatus.

[c20] 20. The apparatus according to Claim 17, further comprising means for introducing a carrier film into the first nip and frangibly fusing the backing film to the embossed film.

[c21] 21. The apparatus according to Claim 17, further comprising means for introducing a backing film into the first nip and fixedly attaching the backing film to the embossed film.

[c22] 22. The apparatus according to Claim 17, further comprising means for cooling the embossing tool and embossed film to a temperature below the resin glass transition temperature before stripping the film from the tool.